THE EFFECT OF ALCOHOL ON OPERATING VARIABLES

THIS treatise has to do with a field in which there has been an unbelievably large amount of experimentation but almost no correlation of data. The present article will attempt to correlate some of the data which has been generally accepted as being true, and to build plausible theories upon the known facts. (This is known in the more refined engineering circles as slinging the bull.)

There are several alcohols in general use, namely: wood alcohol, grain alcohol, rubbing alcohol, fusel oils, etc. A survey among 372 engineering students at Ohio State disclosed the following statistics:

Favorite Beverage	All Engineers	M.E.
Grain alcohol	97%	1%
Wood alcohol	2%	98%
All others	1%	1%

This has been interpreted in some circles as definite proof of something or other.

No attempt will be made in this dissertation to cover any of the alcohols except grain alcohol (C_2H_5OH, ethyl alcohol). This is by far the most widely used alcohol and its effect on operating variables is of great interest.

Ethyl alcohol is not to be confused with ethyl gasoline. Ethyl gasoline improves auto performance whereas ethyl alcohol has been found to cause very erratic operation (to put it mildly).

The best correlation of existing data is given by the following relationship:

$$E = S\frac{Q}{t}Rt_m^{-2}$$

where E=effect, usually measured in staggers per linear foot

S = stagger factor

$\frac{Q}{t}$ = rate of feed, pints per hour

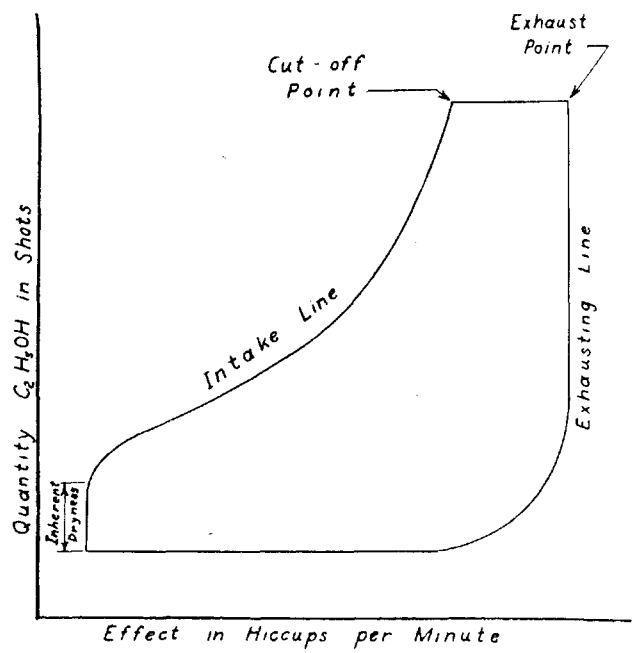
t_m = mean time between dosage, in minutes

R = quality of solution

Some question arises as to whether E should be measured along the path of progression or along the actual distance advanced toward the goal. In this latter case negative results are often obtained. Some investigation has been made on the path of progression. No two cases are ever identical. It will be noted that a straight line relationship is never obtained. However, it is a common experience to find the subject seeking a lower elevation.

As might be expected negative values of Q adversely effect E.

R is sometimes better known as the "Power Factor". A high power factor is generally conceded to be more desirable. R seems to vary among the various engineers, being the highest among the Chemicals and lowest among the Mechanicals. Perhaps this is because the Chemicals have had more experience in the matter.



The importance of PTU on R can not be overlooked. A low PTU will often double or even triple the value of R. An extended experimental program on PTU is now being carried on in the university.

Another very useful relationship is:

$$C = H\ R^2\ E^{-1}$$

where C = the capacity, in pints

H = the human factor.

At present there is no known method of predicting accurate values of H so experimental values must be obtained in every case. Much more accurate values are obtained if due regard is given to the conditions under which the experiment is conducted.